LOW COST DAIRY PRODUCTION UTILIZING EFFICIENTLY HARVESTED FORAGES - THE OHIO EXPERIENCE[1]

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During the mid-1980s, the idea of low investment dairy enterprises using pastured forages as a primary feed source began to surface as an alternative use of resources in southeastern Ohio. The New Zealand dairy industry uses the concept of seasonal dairying and intensive rotational grazing to efficiently produce milk for manufacturing purposes. The question then became - would a New Zealand-type dairy enterprise be applicable to the grasslands in the unglaciated areas of Ohio? During 1987, a seasonal dairying project utilizing intensive rotational grazing was established at the Mahoning County farm of OARDC (Ohio Agricultural Research and Development Center) in Northeast Ohio.

Profitability and economics of such an enterprise plays heavily on the adoption of a system of production different from the norm in the industry. Seasonal dairying is no different. The profitability of seasonal dairying would need to be demonstrated before the dairy industry would consider this system as an alternative to the more conventional year-round dairy enterprise.

Seasonal dairying in this experiment was to have all cows calve during March 15 through May 15 and milk throughout the summer and fall. During early winter in December, the entire herd would then be dried off with the dry period extending through January, February and early March when the cycle would begin again. To make the concept of seasonal dairying work, the entire breeding program is geared towards a twelve-month calving interval, much like a well-managed beef herd.

The advantages to such an approach to dairy production are 1) the entire herd is in the same stage of reproduction and lactation at the same time allowing management to concentrate on tasks such as calving and breeding for short periods of time, 2) it allows for at least two months off during the winter when cows are dry and not requiring much care, and 3) the seasonal enterprise requires less building and equipment investment thereby reducing overhead costs and the cost of production.

With seasonal dairying, there are also some distinct disadvantages. There are at least two months during the winter when no income is received creating potential cash flow problems. The labor distribution is uneven throughout the year with the labor peaks coming when the herd is calving. A high level of management is required and is quite intensive during the calving and breeding seasons. Another disadvantage is that the milk production curve runs counter to the milk price curve, i.e., most of the milk is produced when prices are lowest for the year.

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The concept of intensive rotational grazing (IRG) is one that fits well with production of ruminant livestock especially with seasonal dairying. The idea is to confine animals to a small area with enough forage available that it can be completely consumed in three days at most. When the forage is eaten, the animals are then moved to the next area. At the discretion of the manager, animals can be put into smaller areas and moved more frequently. The goals of IRG are to completely consume all available forage before moving the animals and to keep the forage being grazed in a lush, vegetative state. Different grasses and legumes have been successfully grazed in Ohio. The re-growth time between grazings for legumes is 28-30 days while grasses require 14 to 28 days depending on the time of the season. IRG allows the same areas to be grazed 4-6 times or more during the season which significantly increases stocking rates.

The advantages to IRG are 1) forage quality, quantity and utilization is increased, 2) animal performance is improved due to better forage quality, 3) there is less need for stored feeds, and 4) since animals are doing the harvesting, there is reduced machine harvesting and the associated costs and labor. The disadvantages to adopting IRG are 1) additional fence costs, 2) increased labor required to move fence, and 3) increased management to make IRG successful. One veteran agent claims IRG is "an art based on science" and that art translates into the judgement of management.

The project was established at the Mahoning County farm which had the necessary facilities and land available for this venture. An old bank barn that had been used for beef cattle was converted at low cost for dairy purposes. The renovation of the barn required the installation of a stanchion parlor, the purchase of used milking equipment and a bulk tank, and building a milk house inside the barn. Out-of-pocket investment was $8400. The barn had a partially covered concrete feedlot that was used for loose housing during the winter months. An old corn crib near the barn was converted to a calf-raising facility. A larger bulk tank was purchased in 1989.

Approximately 29 acres of pasture was fenced into six large paddocks using electrified high-tensile fence. The fence construction was contracted out at a cost of $7200. These large paddocks were grazed in smaller paddocks utilizing electrified poly-wire. The manager moved fence twice a day after milking.

The 29 acre pasture used by the dairy herd consisted of 23 acres of fescue and white clover with 6 acres of alfalfa established during 1987. During the project, the alfalfa acreage was used very little for pasture because the soil was contaminated with DDT residue from the site's use as an apple orchard during the 1960s. As a result, the cows were constantly monitored for DDT residues and while never above allowable limits, the residue was ever present.

The ration for the herd consisted of fescue-white clover pasture that was tested for quality several times each month, a 12-16% CP purchased grain ration, dry hay and corn silage that was fed during the dry period to restore body condition. The herd consisted of 50% Jerseys and 50% Holsteins. It was not apparent that one breed had a distinct advantage over the other. Milk sold per cow increased steadily during the project reaching 11,850 pounds during 1990.

The calf-raising program was similar to that found on many Ohio dairy farms. Yearling heifers were pastured behind the milking herd, cleaning up any forages not consumed by the cows. Heifer growth rates were very acceptable, and all heifers were ready to enter the herd as two year olds.

Herd health and the overall management of the dairy herd were excellent. The twelve month calving interval was achieved with good management and the latest breeding technology. The concept of seasonal dairying can be made to work.

Despite the success of the breeding program, the economic results obtained were not as great as desired. Table 1 shows the results in income statement form for 1988, 1989, and 1990. The bottom line, $13363, $7196, and $13521, represents net income before interest payments and income taxes are taken out, the remainder being left for unpaid labor and management and return on investment. Two factors limiting the bottom line profits were milk sold per cow and purchased feed cost, both of which are directly related to the kind and quality of forage being grazed.

The average price received for milk also has an impact on profitability. With the seasonal dairying enterprise, the majority of milk sold would appear to be receiving lower prices throughout the year as shown in Table 2. However, an analysis of milk prices received in Ohio during 1988, 1989 and 1990 adjusted for the seasonal production, shows that the average milk price for the production period was 97-98% of the yearly average price. During the three year period, the average milk price was slightly lower, but not significantly lower.

Seasonal dairying enterprises will be adopted if they are more profitable than conventional dairy enterprises. With very little difference in milk prices, cost of production for the seasonal enterprise needs to be less than those of the conventional enterprise to show additional profits. Table 3 is an enterprise budget for a seasonal dairy enterprise based on the Mahoning experience. Total costs are estimated to be $2425 per cow or $20.21 per cwt. The 1991 Ohio dairy budgets for small and large breeds with comparable production levels and rations estimate production costs to be $2237 to $2703 per cow or $19.15-$22.37 per cwt. Cost of production from 1989 dairy budgets are $2167-$2544 per cow or $18.55-$21.67 per cwt. From the numbers gathered at Mahoning, the cost of production has not been reduced enough to make it competitive with a well-managed conventional enterprise.

An advantage of the seasonal dairy enterprise is the reduced need for building investment and the associated fixed costs. The Mahoning project has achieved a reduced equipment and facilities charge of $219 per cow compared to $493 per cow in the 1991 Ohio Dairy Budgets. However, the low cost investment approach used for the project has resulted in a higher labor input per cow. Total fixed costs, including labor and management and interest and insurance on the cattle as well as building and equipment charges, for the seasonal enterprise are $938 per cow compared to $1141-$1186 per cow in the conventional enterprise. Although fixed costs have been reduced 18-21% over those in the dairy budget, total costs need to be reduced further for seasonal dairying to be competitive.

The use of rotational intensive grazing was more successful in the Mahoning project. Agricultural producers do not normally view pasture as a crop, but experience has shown that properly managed, IRG will produce more higher quality forage at less cost and with less loss than mechanically harvesting and storing the same crop. In addition, it also allows for more production from rough land that cannot be utilized except for grazing animals.

Table 4 shows an enterprise budget for intensively grazed pasture from the Mahoning project. Putting a value on pasture always raises a question to which there is no satisfactory answer. In this example, the pasture charge of $175 per cow to the dairy enterprise represents income to the crop enterprise. The charge per grazing day represents the cow and replacement heifer and a price of $30-$35 per ton of hay equivalent. Even when considering the increased labor and its cost, the intensively grazed pasture enterprise shows a positive return of $68 per acre over all expenses. The concept of IRG makes the pasture enterprise competitive with any other field crop.

The irony of this project is that the forage and its effect on milk production has not allowed for a significant reduction in feed costs. Total feed costs for 1990 were estimated to be $7.90 per cwt. Three eastern Ohio dairymen using IRG with better quality forages, but similar herd sizes, etc., had total feed costs of $5.90 and $6.88 per cwt. for two Holstein herds with 20,000 and 16,000 pound herd averages and $8.09 per cwt. for a Jersey herd with a 12,000 pound average. The forage used in the Mahoning project has apparently limited production and increased feed costs when compared to other similar operations.

Many factors are involved in a dairyman's decision concerning feed methods and systems and the type of dairy enterprise desired. The Mahoning project was designed to examine the feasibility and profitability of intensive rotational grazing and seasonal dairying. After three years, IRG and seasonal dairying are feasible with good management and modern technology. When looking at profitability, IRG appears to be profitable and will help small and medium size dairies reduce feed costs and remain competitive. The profitability of seasonal dairying is more questionable. To be a viable alternative enterprise, additional profits from seasonal dairying need to result from lower production costs than those of conventional dairy enterprises. Although the project was able to show reduced fixed costs, total costs were not reduced enough to be more profitable than the conventional enterprise. In spite of the findings, the combination of IRG and seasonal dairying is an intriguing combination that may have application to small and beginning dairymen in Ohio.

Table 1.

INCOME STATEMENTS[1,2]
for the Mahoning Farm Dairy Program

Preliminary Estimates -- Not for Quotation

	Year		
	1988	1989	1990
Number of cows	30	36	33
Total milk sold (lbs.)	324919	388889	390754
Milk sold per cow (lbs.)	10831	10802	11841
Avg. milk price per cwt.	12.31	12.81	13.73
REVENUE			
Milk and bull calf sales			
Milk sales	39998	49807	53637
Bull calf sales	1220	1810	1821
Total milk and bull calf sales	41218	51617	55458
Market gains on herd[3]			
Ending inventory	33959	34750	35600
less beginning inventory	21450	33959	34750
less purchases	3850	0	0
plus cull cow sales	3331	6363	6321
Total market gain	11990	7154	7171
TOTAL REVENUE	53208	58771	62629
OPERATING COSTS			
Purchased feed[4]	22921	29709	26910
Vet. and medicine	2919	2843	3053
Breeding, milk testing	670	1343	1508
Bedding	919	2000	1210
Supplies	1755	3448	3848
Utilities	3353	4029	4300
Hauling	2518	2943	3019
Land rent[5]	1190	1190	1190
Building rent[5]	1000	1000	1000
Property tax[5]	1000	1000	1000
Total operating costs	38245	49505	47038
Depreciation[6]	1600	2070	2070
TOTAL EXPENSES	39845	51575	49108
INCOME BEFORE INTEREST AND TAXES[7]	13363	7196	13521

Footnotes to the Income Statements

[1]These income statements have been prepared from data collected at the Mahoning Farm Dairy Project. Unless otherwise noted, figures are based on actual performance. When preparing these statements, performance reflected is from an individual perspective and not from a research farm perspective. An individual perspective has been taken to more adequately model performance had the project been a commercial enterprise. The individual is presumed to own all the cows but rents the land and buildings. The individual pays property taxes as part of the rent. The cost of modifications to the buildings is borne by the individual.

[2]Income statements are prepared using modified costing principles.

[3]Market gains result from changes in inventories less expenditures for purchases plus revenue from culled animals. All purchased and raised cows are treated similarly so no depreciation is charged on purchased cows. End of year inventory numbers are:

	---------- end of the year --------			
	1987	1988	1989	1990
Cows	18	23	24	22
Springers	0	13	12	17
Heifer calves	15	13	17	16

Inventory values are based on a $900 price for cows, $600 price for springers, and $350 price for calves.

[4]Purchased feed includes silage bagging expense of $2,532 in 1988, $2,307 in 1989, and $2,221 in 1990.

[5]These costs reflect estimates if an individual had rented the barn and land.

[6]Depreciation reflects 1987 barn renovation of $8,402 and fence purchase of $7,204, 1988 equipment purchases of $390, and a 1989 bulk tank purchase of $4,700. Depreciation is calculated using a 10 year life and a straight-line method.

[7]Income before taxes and interest provides funds for any income tax and interest payments. After taxes and interest have been paid, income before taxes and interest provides returns for unpaid labor, investment, and management.

Table 2.

OHIO MILK PRICES PER CWT. vs. MILK YIELD CURVE

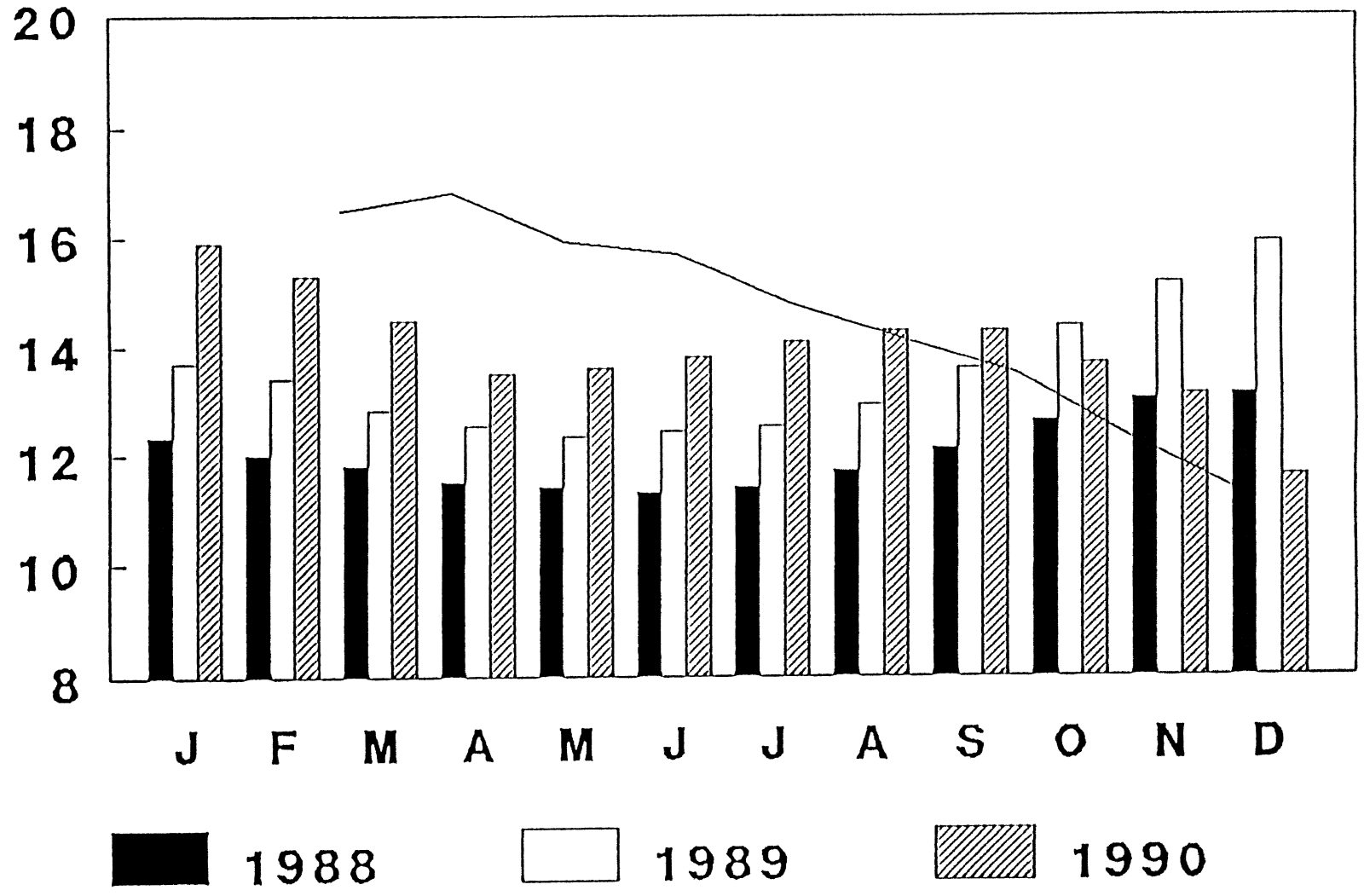

Table 3.

Enterprise Budget
Seasonal Dairying
1990

INCOME	
Milk - 12,000 lbs. sold @ $13.75	$1650
Calves	55
Cull cows	192
	$1897
EXPENSES	
Variable	
Feed	
Grain & Supplement (2 1/2-3 T)	$ 500
Hay (2 T)	200
Corn Silage (3 T)	60
Pasture (233 grazing days @ $.75)	175
Total Feed	$ 935
Other	
Vet. & Medicine	$ 93
Breeding & Testing	46
Utilities	130
Bedding	37
Supplies	117
Marketing	91
Interest on Operating[1]	38
Total Other	$ 552
Total Variable	$1487
Fixed	
Labor (75 hrs. @ $7)	$ 525
Management - 5% of Income	95
Interest & Insurance[2]	99
Equipment[3]	100
Facilities[4]	119
Total Fixed	$ 938
Total Costs	$2425
Return Over Variable Costs	$ 410
Return Over Total Costs	($ 528)
Feed Costs Per Cwt.	$7.79
Variable Costs Per Cwt.	$12.39
Total Costs Per Cwt.	$20.21

Footnotes to Dairy Enterprise Budgets

Unless otherwise noted, returns and costs are based on data from the Mahoning Farm Dairy Project shown in the attached income statements. These budgets include these opportunity charges, thereby reflecting the full economic costs of operating the dairy enterprise. Long-run, viable operations must have non-negative returns above total costs.

[1]Interest charge equals 10 percent times 1/2 of the purchased feed costs.

[2]Based on an average cow value of $650 and a $300 heifer value per cow. Interest is 10 percent and insurance is .43 percent of total value.

[3]Based on $15,000 total cost times 20 percent, divided by the number of cows.

[4]Based on a $21,000 total cost times 17 percent, divided by the number of cows.

Table 4.

Enterprise Budget
Intensive Rotational Grazing

INCOME[1]	
233 grazing days x $.75 x 33 cows/23 acres	$250
EXPENSES	
Seed[2]	$ 4
Fertilizer[3]	10
Machinery & Equipment[4]	10
Fence[5]	35
Land[6]	40
Labor (10 hrs. x $7)	70
Management - 5% of Income	13
Total Expenses	$182
Return over expenses	$ 68

Footnotes to IRG Budget

[1]Income in this budget represents the pasture charge on the dairy budget. The charge of $.75 per grazing day is for a dairy cow and replacement with the forage priced at $30-35 per ton of hay equivalent.

[2]Seed costs are minimal over the life of a well-managed pasture, but some cost needs to be recognized.

[3]If all forage is harvested as pasture, approximately 80 percent of nutrients are recycled back on the pasture thereby greatly reducing fertility costs. This charge approximates 100 lbs. of 0-13-43 and its application annually. There would be an additional cost if some nitrogen is required.

[4]Some clipping of pasture may be necessary. This charge represents clipping plus any other machine work necessary.

[5]$5400 x 15 percent annual charge.

[6]Cash rent for comparable land.